



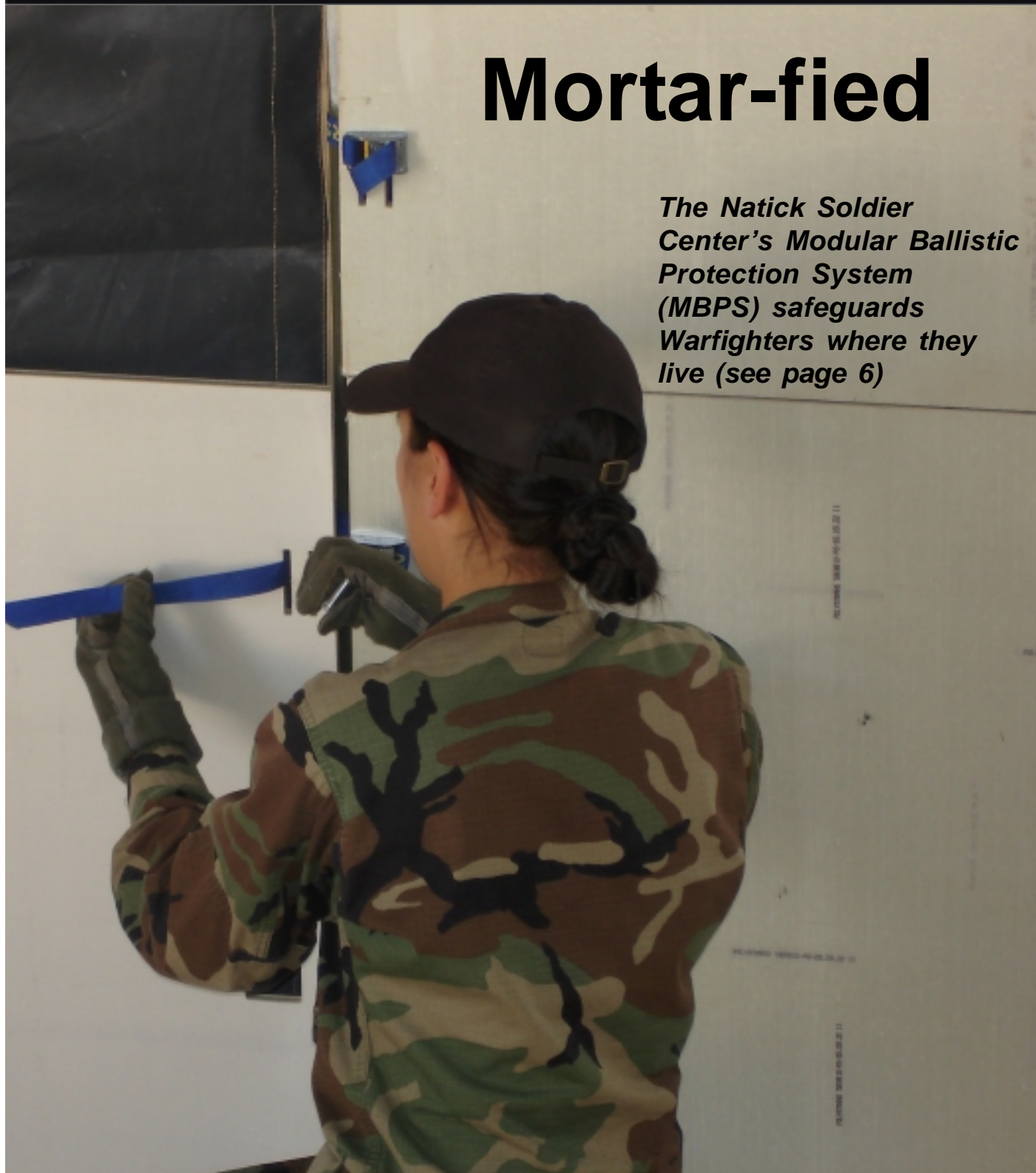
# THE WARRIOR

Natick, Massachusetts

July-August 2006

## Mortar-fied

*The Natick Soldier  
Center's Modular Ballistic  
Protection System  
(MBPS) safeguards  
Warfighters where they  
live (see page 6)*



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Courtesy photo

Cover photo: The Natick Soldier Center's Modular Ballistic Protection System (MBPS) consists of panels that are placed inside the skins of shelters. The panels provide enhanced ballistic protection for Warfighters inside their tents.



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# Walls of light

## ***The Natick Soldier Center is developing electroluminescent (EL) panels for shelters***

**By Jane Benson**  
Editor

The Natick Soldier Center is developing electroluminescent (EL) panels for shelters.

The Natick Soldier Center (NSC) is working with the private company Crosslink to develop electroluminescent (EL) textile technology. The EL technology will be incorporated into panels, which can then be attached to the walls of softwall shelters to function as a white light source. Alternatively, the EL technology can be directly integrated into the shelter materials thus eliminating attachment assembly.

NSC is collaborating with Crosslink, a St. Louis-based company that develops and manufactures electroactive polymer coatings for integration with a variety of plastics, metals, and textiles, under a Broad Agency Agreement intended to encourage innovative approaches to technology research.

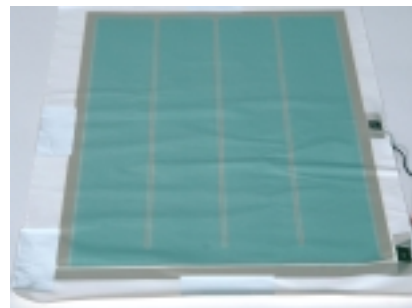
The EL technology is an improvement over the typical lighting source used in Army shelters.

According to NSC project officer Benjamin LaPointe, "Soldiers currently use hardened fluorescent lights. These fluorescent lights are in a special container to protect the fragile glass tubes. They are heavy, contain toxic materials, have trouble starting in the cold, and have to be set up after the shelter is erected."

"In contrast, the new EL panels are flexible, durable, and lightweight. The panels can be attached to tent walls, and the lighting can be collapsed with the shelter so that troops don't have to come back and get them later. The system thus enhances logistics and reduces deployment time," said LaPointe.

The lighting system can be pre-attached to or directly integrated into the softwall shelter so that Warfighters will not have to set up lights in addition to setting up the shelter.

LaPointe explained, "The idea is that the lights will be semi-permanently attached to the inside of the shelter."



Warrior photo by Sarah Underhill

**Electroluminescent panels can be attached to the walls of softwall shelters to function as a white light source.**

The light panels use an efficient power controller developed by Crosslink, which can be plugged into any normal power outlet.

The panels can withstand being punctured, torn, twisted or crunched and still light up.

According to LaPointe, this system would be particularly useful in combat environments such as Iraq and Afghanistan, where quick deployment time and the ability to pack up and relocate swiftly are important.



Courtesy photo

**Since the electroluminescent panels are durable, flexible and lightweight, the panels are ideal for use in combat environments such as Iraq and Afghanistan. The panels eliminate the need to install traditional light fixtures and can be punctured, torn, twisted or crunched and still light up.**



# Pull a tab and 18 hot dinners are served!

## ***Natick Soldier Center's Unitized Group Ration-Express (UGR-E) brings group dining to remote units***

***By Jane Benson***  
*Editor*

The Natick Soldier Center's (NSC's) Unitized Group Ration-Express (UGR-E) provides a group dining capability anytime, anywhere.

With a quick pull of a tab, the meals are ready in 30 to 45 minutes and provide a change of pace from Meals, Ready-to-Eat (MREs). UGR-E modules serve hot meals for up to 18 Warfighters without requiring kitchen equipment, cooks, fuel, or a power source. UGR-Es also reduce the costs and logistical burden associated with using a field kitchen.

"Warfighters would utilize the UGR-E in locations where they are unable to use a Mobile Kitchen Trailer (MKT), but want a group dining capability. This could be before MKTs make it to the field or if they are located too far away for the group to congregate there. UGR-Es also eliminate the need for trucks to bring them food in insulated containers," said Shari Dangel, an NSC physical scientist.

"The UGR-E borrows technology from the MRE's Flameless Ration Heater (FRH) to heat the food. These magnesium-based heaters produce a significant amount of heat with relatively small amounts of raw material. All that is required to start the reaction is mixing salt water with the magnesium. The UGR-E contains four heaters that are 10 times the size of each single FRH heater," explained Dangel.

Dangel said that there are two types of UGR-Es. The Type I UGR-E requires Warfighters to place the four heaters into the heater trays before pulling the tab. With Type II UGR-Es, the heaters are sealed into the heater trays. Warfighters need to pull one tab that will uncover the heaters and then pull a second tab that will release the activator solution.

According to Peter Lavigne, NSC chemical engineer, "To meet the immediate needs of the Services, an accelerated development effort will field the UGR-E initially as Type I, and later the Type II will be transitioned as improvements in the heating system are completed. We're also investigating other opportunities to improve the concept, to include the use of coated fiber heating trays that are low cost, lightweight and offer improved disposability and recyclability."

According to Dangel, the first offering of the UGR-E will include three breakfast menus and six lunch/dinner menus. The meals can be easily transported with the unit. The four six-pound polymeric traypacks include an entrée, vegetable, starch, dessert, plus snacks as well as dining trays, beverages, eating utensils and serving utensils.

***The technology most benefits small, remote units operating in austere environments.***



Warrior photo by Sarah Underhill

**Activated Unitized Group Ration-Express (UGR-E) modules heat up in the field. Prototype UGR-Es have been sent to Iraq and Afghanistan.**



Warrior photo by Sarah Underhill

The Unitized Group Ration-Express (UGR-E) , “the kitchen in a carton,” contains an entrée, vegetable, starch, and dessert, as well as serving spoons, drink packs, serving trays, utensils, snacks, and a self-heating unit cover.

***UGR-E modules serve hot meals for up to 18 Warfighters without requiring kitchen equipment, cooks, fuel, or a power source. UGR-Es also reduce the costs and logistical burden associated with using a field kitchen.***

"While the food is heating Warfighters can enjoy the snack items included in the UGR-E. These can include M&M's, Reese's Pieces, Trail Mix, and powdered beverages," said Dangel.

According to Dangel, Warfighters who have evaluated the UGR-Es have liked that they do not have to rely on drivers to bring them food in insulated containers cooked in field kitchens hours beforehand. They can wait until they are almost ready to eat to start heating the food, then eat it while it's still hot.

The technology most benefits small, remote units operating in austere environments.

According to Dangel, prototype UGR-E's have been sent to both Afghanistan and Iraq.

Future improvements are already in the works.

"An Enhancement Box, or E-Box, is also being developed to provide a supplement for the UGR-E. It will include milk, cereal, bread, and other complementary items that will increase the variety and nutrition offered by the ration," said Lavigne.

# Mortar-fied

## ***The Natick Soldier Center's Modular Ballistic Protection System (MBPS) safeguards Warfighters where they live***

**By Jane Benson**  
*Editor*

The Natick Soldier Center (NSC) has partnered with the Advanced Engineered Wood Composites (AEWC) Center at the University of Maine to develop an armor panel system that can be integrated easily into standard soft-walled shelter frames. The Modular Ballistic Protection System (MBPS) is designed to protect against indirect fire such as lethal mortar fragmentation while withstanding the secondary blast pressure from a mortar explosion.

"The Modular Ballistic Protection System is a key advancement in the defense against indirect fire. Armor systems should be designed with mobility, time, and manpower in mind; thereby protecting Soldiers without overburdening them. The MBPS does just that. It is lightweight, quickly deployable, and provides Soldiers with enhanced ballistic protection where it never existed before - their tents," said Ryan Devine, NSC engineer.

Devine added that the panels are placed inside the shelter skin, preventing the shelter from being easily identified as a high-value target.

The MBPS panels are a sandwich design. The outer layers are made of E-glass, a ballistic armor material. The E-glass surrounds a core of oriented-strand board.

"The E-glass is what gives the panels their ballistic effectiveness. The wood core is what gives the panel additional flexural strength," said Devine.

"Mortar attack modeling has indicated that the MBPS would protect against more than 99 percent of mortar fragments," added Devine. "NSC has worked to greatly enhance the fragmentation model so that instead of just giving a percentage of fragments defeated, we will give an actual injury profile that predicts the level of injury throughout the detonation area both with and without MBPS protection."

Protection provided by the MBPS is not equal to heavy-duty armor systems like concrete barriers. However, the MBPS has many benefits that heavy-duty armor systems do not, such as being lightweight, portable, and reusable, all while providing outstanding ballistic protection.

According to Devine, the MBPS requires no modification to a frame, no additional anchoring, and no special tools to install. The panels are attached using a strap and buckle system, and each 8-foot module can be installed by four Soldiers in 15 minutes.

NSC plans to make ongoing improvements to the MBPS. The panels have already been modified so they can be seamlessly integrated into Force Provider tent camps, the armor composite itself is being continuously tested and refined, and more user-friendly integration methods are a constant pursuit.

NSC is working on a quick deployment of a prototype system to a combat zone.



*Courtesy photo*

**The Modular Ballistic Protection System (MBPS) consists of panels that are placed inside the shelter skin, preventing the shelter from being easily identified as a high-value target.**





Courtesy photo

The Modular Ballistic Protection System (MBPS) requires no modification to a frame, no additional anchoring, and no special tools to install. The panels are attached using a strap and buckle system.

***"The Modular Ballistic Protection System is a key advancement in the defense against indirect fire. Armor systems should be designed with mobility, time, and manpower in mind; thereby protecting Soldiers without overburdening them. The MBPS does just that. It is lightweight, quickly deployable, and provides Soldiers with enhanced ballistic protection where it never existed before - their tents." Ryan Devine, NSC engineer.***



Courtesy photo

The effectiveness of the Modular Ballistic Protection System is evaluated during a blasting exercise.

# Ready for ascent

**Scientists at the U.S. Army Research Institute of Environmental Medicine (USARIEM) are working to alleviate high-altitude sickness in Soldiers being deployed to Afghanistan**

**By Jane Benson**  
Editor

Scientists at the U.S. Army Research Institute of Environmental Medicine (USARIEM) are investigating ways to help Soldiers adjust to high-altitude environments.

Soldiers being sent to Afghanistan are often quickly deployed to high-altitude environments via helicopter, leaving little time for their bodies to adjust and putting them at risk for contracting high-altitude sickness. High-altitude conditions, which include adjusting to less oxygen and thinner atmosphere, can impact even the most physically fit Soldier.

According to USARIEM's Dr. Stephen Muza, high-altitude conditions, at a minimum, affect stamina and cause Soldiers to fatigue much more quickly. Other problems can develop as well.

The most prevalent type of altitude sickness is acute mountain sickness (AMS), which can cause headaches, dizziness, nausea, and make it difficult to fall asleep. According to Muza, AMS typically occurs within 4-12 hours.

Although most people experience the aforementioned symptoms of AMS, 100 percent of the population experiences a decline in task performance.

"Soldiers can still make accurate decisions, but it takes them longer to do so. Altitudes above 5000 feet can impair vision, especially the ability to see color," said Muza.

AMS symptoms will often dissipate once a Soldier's body adjusts to the high-altitude environment, but sometimes AMS can intensify into pulmonary edema, which is caused by a build up of fluid in the lungs and can lead to shortness of breath and heavy coughing.

AMS can also transform into cerebral edema, which is caused by an increased blood flow to the brain. Cerebral edema can cause swelling, disorientation, hallucinations and can impact physical coordination. It can be deadly if left untreated.

USARIEM scientists are investigating the use of pre-exposure to high-altitude conditions to prevent altitude sickness to help Soldiers who need to make sudden and prolonged ascents to altitudes of 5,000 to 14,000 feet.



Warrior photo by Sarah Underhill

**Soldier performance under high- and low-altitude conditions is recorded for a variety of tasks. Pvt. Jerrod Howard performs a task measuring marksmanship.**





Warrior photo by Jane Benson  
**Dr. Stephen Muza (left) and co-investigator Dr. Beth Beidleman, both of the U.S. Army Research Institute of Environmental Medicine (USARIEM), monitor human research volunteer, Pvt. David Kratzer (center). This test is measuring the ability of the heart and lungs to deliver oxygen to the exercising muscle.**



Warrior photo by Jane Benson  
**Pvt. Dale Bartlett provides a blood sample, which will be analyzed to determine if hormones beneficial to altitude acclimatization are present.**

Soldiers will perform a myriad of typical tasks in USARIEM's Hypoxia Room and Hybobaric Chamber, which replicates a high-altitude environment. The Hypoxia Room is a low-cost, low-oxygen environment and can be replicated anywhere, even in small nuclear, biological, and chemical (NBC) shelters.

The study will document changes in Soldier performance under both high-altitude and low-altitude conditions. The study will also document changes in performance and well-being before and after Hypoxia Room treatments. USARIEM's investigation will reveal exactly how much time Soldiers need to be exposed to high-altitude conditions to offset the effects of altitude sickness.

Based on observations so far, Muza said it appears Soldiers exposed to 10,000 - 14,500 feet for three or four hours a day are ready to undertake their mission with less sickness and higher performance.

According to Muza, if the Hypoxia room treatments are done over six to seven days, it has been found that the treatments can increase physical stamina by 30 percent and can reduce or eliminate AMS. USARIEM scientists have found that two-thirds of improvement occurs during the first week of treatments.

One result of the study will be the creation of altitude preparation guidelines. Muza said that USARIEM's research will develop predictive models to determine rates of decline in physical and cognitive abilities in correlation to how fast Soldiers need to ascend.

In addition to the Hypoxia Room treatments, recently completed studies by Muza's team have determined that a high-carbohydrate diet in high-altitude conditions improves Soldier stamina and appears to reduce AMS. However, taking anti-oxidants or creatine did not lessen the effects of high-altitude exposure. Muza says that future studies will examine several other ways to lessen the effects of exposure to high-altitude conditions.

The study should be completed sometime prior to the end of 2006.



Warrior photo by Sarah Underhill  
**During the study, Soldiers, including Pvt. Jaime Rodriguez pictured here, will be given Hypoxia Room treatments to see if their exercise performance improves under high-altitude conditions.**

# New Facilities

## ***Natick Soldier Center adds to food laboratory capabilities***

***By Jane Benson***  
*Editor*

A ribbon-cutting ceremony for the Natick Soldier Center's (NSC) expanded Food Laboratory Facility was held on June 23.

The expansion includes five microbiology labs, an analytical chemistry lab, and a nanotechnology packaging materials lab. The expansion also includes three new temperature-controlled rooms to store operational rations undergoing shelf-life studies and a food evaluation lab.

Brig. Gen. R. Mark Brown, commanding general of the U.S. Army Soldier Systems Center, praised the event as another great day in NSC history. He noted that NSC was selected as the Department of the Army Research and Development Laboratory of the Year (Small Development Lab Category) for four out of the past five years and that Philip Brandler, director of the NSC, was chosen as a Lab Director of the Year by the Federal Laboratory Consortium (FLC) for Technology Transfer. Brown also noted that Gerald Darsch, director of NSC's DoD Combat Feeding Directorate, received the Decoration for Exceptional Civilian Service.

Brown noted that Soldier performance has been tied to food supplies throughout the history of war. He credited Brandler and Darsch for the high quality food that Warfighters enjoy today and commended them for working to make great food even better in the future. He praised NSC's world class workforce for developing world class technology.

Joe Dalton, district director, office of Congressman Edward J. Markey, praised NSC products and technologies, including Meals, Ready-to-Eat (MREs). He stated that MRE really stands for Morale, Readiness and Energy. He commended NSC employees for the tremendous work they do for the country.

Brandler said that he felt very fortunate to witness this momentous event, the realization of a dream that began 17 years ago. He said he was very excited about the increased capability the lab expansion will provide.

Darsch only had two words to say, "Betty Davis." Davis was the primary point of contact for the project, and he said that she did an unbelievable job.



Warrior photo by Sarah Underhill

**Philip Brandler, director of the Natick Soldier Center, and Brig. Gen. R. Mark Brown, commanding general of the U.S. Army Soldier Systems Center, share a laugh following a ribbon-cutting ceremony recognizing the opening of NSC's food lab expansion.**

## ***Ground broken on Natick Soldier Systems Center's new thermal test facility***

***By Jane Benson***  
*Editor*

A groundbreaking ceremony for the Soldier Systems Center's (SSC) new thermal test facility was held on June 23. The new facility will provide unprecedented research evaluation capabilities. The building will house state-of-the-art equipment for evaluations of materials, including full-scale flame testing on protective ensembles and shelters.

The installation's scientific and engineering teams will be able to use the facility for the research and development of flame and thermal protection equipment. A suite of lasers will be used for the development of laser protection technologies.

Brig. Gen. R. Mark Brown, commanding general of the U.S. Army Soldier Systems Center, stated that the groundbreaking marked a great day for the U.S. Army Soldier Systems Center, for the U.S. Army and for the Soldier. He said that flame is a constant threat to Soldiers and that the new facility will go a long way toward the rapid development of equipment to protect them.

Joe Dalton, district director, office of Congressman Edward J. Markey, commented on how NSC was selected as the Department of the Army Research and Development Laboratory of the Year (Small Development Lab Category) for four out of the past five years and the one year they didn't win was the year they didn't enter. Dalton joked if he were an ESPN commentator he would have to say that NSC is on fire!

He noted the facility's enormous importance to the Warfighter and thanked everyone for all the organization does in service to the nation.

Natick Soldier Center Director Philip Brandler said that the thermal testing facility adds significantly to the capability of the organizations resident on the Natick site, and expansions in capability and infrastructure such as the thermal test facility are in sync with Gen. Benjamin Griffin's vision of taking Natick to the next level. Griffin is the commanding general of the U.S. Army Materiel Command.

## **Patents**

**Patent Issued: 7,056,675 B2**

Date: June 6, 2006

Inventors: Lynne Samuelson, Ferdinando Bruno, Sukant K. Tripathy, Ramaswamy Nagarajan, Jayant Kumar, Wei Liu

Title: Method of Forming an Electrically Conductive Connection Utilizing a Polynucleotide/ Conductive Polymer Complex

Description: The present invention relates to when a conductive polymer is formed enzymatically in the presence of a polynucleotide template and the polynucleotide template affects the molecular weight and conformation of the conductive polymer.

*If you would like to submit news regarding an award, patent, or other accomplishment, please email [IMNE-SSC-PA@natick.army.mil](mailto:IMNE-SSC-PA@natick.army.mil). Items are run on a space-permitting basis and are subject to editing.*





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